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**WILDLIFE PROTECTION, MITIGATION, AND ENHANCEMENT PLAN  
MINIDOKA DAM**

Final Report

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## TABLE OF CONTENTS

	<u>Page</u>
Acknowledgments	v
Abstract	vi
Introduction	1
Facility Description	2
Impacts on Wildlife	4
Methods	7
Selection of Target Species and Mitigation Goals	7
Assessment of Mitigation Project Benefits	8
Habitat Evaluation Procedure	8
Mitigation Crediting	8
Assessment of Mitigation Project Costs	9
Advance Design	9
Implementation	9
Operation and Maintenance	9
Monitoring	10
Results and Discussion	11
Mitigation Goals/Target Species Management Goals	11
River Otter Plans, Goals, and Objectives	11
Sage Grouse Plans, Goals, and Objectives	12
Mule Deer Plans, Goals, and Objectives	13
Yellow Warbler Plans, Goals, and Objectives	14
Mitigation Goals/Fish and Wildlife Program Standards	15
Mitigation Proposals	18
Riparian/river Protection/enhancement	18
Shrub-steppe Protection - South Hills	20
Mitigation Plan Summary	21
Alternative Mitigation Options	26
Shrub-steppe Enhancement - Minidoka National Wildlife Refuge	26
Shrub-steppe Enhancement - USBLM Lands	27
Shrub-steppe Protection - Adjacent to Minidoka National Wildlife Refuge	28
Mitigation Options/Fish and Wildlife Program Standards	29
Literature Cited	32

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Minidoka Dam pre- and post-construction cover type acreages.	5
2. Minidoka Dam impacts to target species in the study area.	6
3. Minidoka Dam prioritized wildlife mitigation goals and preferred options.	22
4. Estimated benefits (habitat units) of Minidoka Dam mitigation proposals.	24
5. Estimated costs of Minidoka Dam mitigation plan.	25

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## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Minidoka Dam and Reservoir.	3
2. Minidoka Dam proposed mitigation areas.	23

## LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
A. Mitigation Target Species Models	35
B. Public Involvement Certification	41
C. Letters of Comment	45

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## ABSTRACT

Under direction of the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501), and the subsequent Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, a wildlife protection, mitigation, and enhancement plan has been developed for the U.S. Bureau of Reclamation's Minidoka Dam and Reservoir in south-central Idaho. This plan was developed to fulfill requirements of Section 1003(b)(4) of the Fish and Wildlife Program. Specific objectives of this study included the following:

- 1) Develop protection, mitigation, and enhancement goals and objectives for target wildlife species;
- 2) Identify potential protection, mitigation, and enhancement opportunities to achieve the mitigation objectives; and
- 3) Coordinate project activities with agencies, tribes, and the public.

The interagency work group previously assessed the impacts of Minidoka Dam on wildlife (Martin and Meuleman 1989). There were estimated losses of 10,503 habitat units (HU's) for some target wildlife species and gains of 5,129 HU's for other target species. One habitat unit is equal to one acre of prime habitat for a given target species.

The interagency work group used the equal replacement (equal trade-off) method to credit benefits to target species. This method weights the value of each target species equally, and resulted in a net loss of 5,374 HU's for an overall mitigation goal.

The work group agreed that mitigation efforts should be directed toward target species that were negatively impacted by Minidoka Dam. They developed the following prioritized mitigation goals: 1,531 river otter HU's in riparian/river habitat, 1,922 sage grouse HU's in shrub-steppe (sagebrush-grassland) habitat, 1,746 mule deer HU's in shrub-steppe habitat, and 175 yellow warbler HU's in deciduous scrub-shrub wetland habitat.

The work group proposed the following preferred mitigation options, in priority order:

- 1) Provide benefits of 1,706 river otter and yellow warbler HU's by protecting and enhancing riparian/river habitat in south central Idaho, preferably in the McTucker Island, Shoshone Creek, Little Wood River, Big Wood River, Big Cottonwood Creek, Hagerman, Devil's Corral, Camas Creek, Clover Creek, Rock Creek (Twin Falls County), Huft Creek, Rock Creek (Blaine County), Salmon Falls Creek, Little Goose Creek, or Frenchman's Island areas; and
- 2) Provide benefits of 3,668 sage grouse and mule deer HU's by protecting and enhancing shrub-steppe (sagebrush-grassland) habitat, preferably in the South Hills area.

Mitigation planning activities are being coordinated with the Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, U.S.

Bureau of Land Management, Shoshone-Bannock Tribes, Northwest Power Planning Council, Bonneville Power Administration, Pacific Northwest Utilities Conference Committee, Idaho Department of Lands, Idaho Power Company, The Nature Conservancy and other conservation groups, local governments, county commissions, and other members of the public.

## INTRODUCTION

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501) directed that measures be implemented to protect, mitigate, and enhance fish and wildlife to the extent affected by development and operation of hydropower projects in the Columbia River Basin. This Act created the Northwest Power Planning Council, which in turn developed the Columbia River Basin Fish and Wildlife Program. This Program established a four part process:

- 1) Wildlife Mitigation Status Reports -- to identify mitigation proposed, mitigation required, mitigation implemented, and current studies and planning;
- 2) Wildlife Impact Assessments -- to quantify wildlife and habitat impacts using the best scientific information available;
- 3) Wildlife Protection, Mitigation, and Enhancement Plans -- to provide a plan to mitigate wildlife and habitat losses pursuant to Sections 4(h)(5), (6), and (10a) of the Northwest Power Act; and
- 4) Implementation of mitigation projects -- to protect, mitigate, and enhance wildlife to the extent affected by development and operation of hydroelectric facilities.

This wildlife protection, mitigation, and enhancement plan for Minidoka Dam was developed to fulfill requirements of Section 1003(b)(4) of the Columbia River Basin Fish and Wildlife Program. Specific objectives of this study included the following:

- 1) Develop protection, mitigation, and enhancement goals and objectives for target wildlife species;
- 2) Identify potential protection, mitigation, and enhancement opportunities to achieve the mitigation objectives; and
- 3) Coordinate project activities with the interagency technical work group, Northwest Power Planning Council, Bonneville Power Administration, Pacific Northwest Utilities Conference Committee, and the public.

The interagency technical work group was comprised of the U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (USBLM), Shoshone-Bannock Tribes, and Idaho Department of Fish and Game (IDFG). This report was funded by the Bonneville Power Administration.

## FACILITY DESCRIPTION

The features and original authorized purposes of the facility were described in the Minidoka Dam and Reservoir Mitigation Status Report (Martin and Mehrhoff 1985):

Minidoka Dam is on the Snake River, 10 miles northeast of Rupert, Idaho [Figure 1]. The dam backs water up the Snake River nearly to Eagle Rock, about 7 river miles below American Falls Dam. At the normal full pool level (elevation 4,245 feet), the reservoir is about 34 miles long, up to 1.7 miles wide, and 11,850 acres in size. The reservoir is known as Lake Walcott.

The reservoir has a storage capacity of 210,000 acre-feet. The dam impounds 95,200 acre-feet of active storage for power production and the irrigation of about 120,000 acres of farmland (USFWS 1980a). Irrigation releases are made between April and November. Reservoir elevation during this period is 4,245 feet. It is lowered to 4,240 feet by the first part of December to prevent ice damage to the spillway flashboards (USBR 1981a).

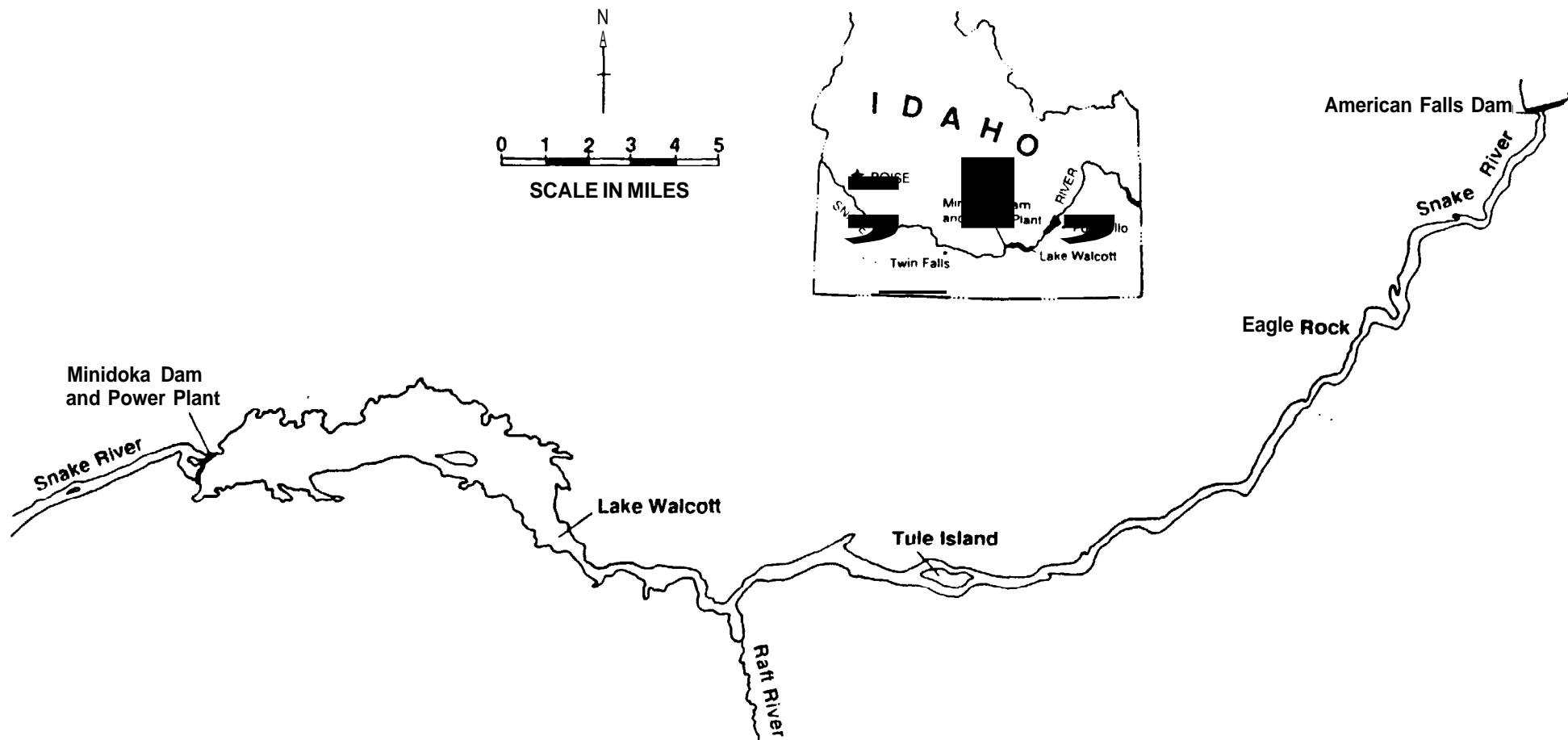
The power conduits have a capacity of 4,850 cubic feet per second (cfs). The power plant has a maximum capacity of 15.8 megawatts. The spillway is a combination of three 15.5-foot by 20.7-foot radial gates and an uncontrolled overflow weir consisting of 5-foot-high flashboards. The spillway flows average 4,000 to 5,000 cfs during summer (USBR 1982). However, spills in excess of 20,000 cfs have occurred (USBR 1981b).

Minidoka Dam was authorized in 1904, by the Secretary of the Interior, under the Reclamation Act of 1902. Dam construction began in 1904, and was completed in 1906. In 1908, construction began on the first federal hydroelectric power plant in the northwest. In 1909, it was supplying power for pumping water to lands south of the Snake River.

The original authorized purposes were for irrigation and power production. The Secretary of the Interior authorized Minidoka Dam after he concluded that the Director of the Geological Survey had proven the project to be feasible. The Director's report stated that "it is possible to irrigate by gravity about 68,000 acres of good land; in addition, it is possible to generate over 10,000 horsepower, which can be used to pump and supply water to about 53,000 acres of land lying above the gravity canals" (USBR 1949).

By Executive Order in 1909, President Theodore Roosevelt created the management area known now as the Minidoka National Wildlife Refuge (NWR). He named it the Minidoka Reservation, and established it for the purpose of protecting native birds.

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**Fig. 1. Minidoka Dam and Reservoir.**



## IMPACTS ON WILDLIFE

Martin and Meuleman (1989) evaluated Minidoka Dam and Reservoir impacts to wildlife. For this evaluation, an interagency team of biologists used the Habitat Evaluation Procedure (HEP) (USFWS 1980b) to estimate impacts to wildlife in terms of habitat units (HU's). For a given species, one HU is equivalent to one acre of prime habitat. The interagency team chose target species to represent a broad spectrum of wildlife and habitats affected by the hydropower facility. The species were chosen because they are of high priority according to state or federal programs, and/or because they are indicator species used to describe habitat conditions for groups of species with similar habitat needs. For each target species evaluated, the interagency team estimated the effects of the project on the species' habitat quality measured with the Habitat Suitability Index (HSI). An HSI is a number between 0 and 1.0. It is an index that represents the capacity of a habitat to support a fish or wildlife species. Species models, comprised of habitat variables, were used during HSI estimation. Habitat units for each target species were calculated by multiplying its HSI times the acreage in the study area providing habitat for the species.

A total of 12,414 acres was quantified by cover type in the study area for pre- and post-construction conditions (Table 1). Wetland cover types are described in Cowardin et al. (1979), and upland cover types are generally described in USFWS (1980c). The pre-construction study area contained mostly sagebrush-grasslands (7,990 acres) in the upland area inundated. It also supported a riparian corridor containing 33.6 miles of the Snake River, 2.6 miles of the Raft River, and an estimated 935 acres of emergent and willow-dominated wetlands. Many islands existed in the river channel. The Snake River was uncontrolled in the early 1900's, and flood flows were greater than flows that occur now.

The present-day study area is primarily lacustrine, with an estimated 4,376 acres of submerged plant beds. The shoreline of Minidoka Reservoir and the spillway support 362 acres of wetlands, primarily emergent and willow-dominated. Several islands exist within the reservoir. The 150-acre spillway area below the dam contains a complex of wetlands, uplands, and islands that are valuable wildlife habitat. Although some aspects of the dam and reservoir have been positive, the overall impact has been negative. The interagency work group's assessment of impacts to target wildlife species showed a net loss of 5,374 HU's in the Minidoka Dam and Reservoir study area (Table 2).

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Table 1. Minidoka Dam pre- and post-construction cover type acreages.<sup>1</sup>

	Emergent wetland	Deciduous scrub-shrub wetland	Deciduous forested wetland	Lacustrine	Riverine	Sagebrush- grassland	Agriculture	Mining area	Total
Pre-construction	502	433	0	0	3,321	7,990	52	116	12,414
Post-construction	321	37	4	11,692	106	254	0	0	12,414
Net change	-181	-396	+4	+11,692	-3,215	-7,736	-52	-116	

<sup>1</sup> Study area for these acreages was from the lower end of Minidoka spillway upstream to the upper end of Minidoka Reservoir. Acreages are for cover types within the boundary of the reservoir and spillway high water lines, plus areas where wetlands have become established around the reservoir and spillway.

Table 2. Minidoka Dam impacts to target species in the study area.<sup>1</sup>

Target species	Pre-construction			Post-construction			Net impact	
	Acres	HSI	HU's	Acres	HSI	HU's	Acres	HU's
Mallard	3,660	0.20	732	4,528	0.20	906	+868	+174
Redhead	332	0.72	239	6,735	0.70	4,714	+6,403	+4,475
Western grebe	0	-	0	321	0.85	273	+321	+273
Marsh wren	935	0.06	56	325	0.81	263	-610	+207
Yellow warbler	433	0.87	377	37	0.95	35	-396	-342
River otter	3,897	0.80	3,118	125	1.0	125	-3,772	-2,993
Mule deer	8,925	0.41	3,659	616	0.40	246	-8,309	-3,413
Sage grouse	7,990	0.47	3,755	0		0	-7,990	-3,755
Total net impact (HU's)								-5,374

- <sup>1</sup> Study area for these impacts was from the lower end of Minidoka spillway upstream to the upper end of Minidoka Reservoir. Impacts were assessed within the boundary of the reservoir and spillway high water lines, plus areas where wetlands have become established around the reservoir and spillway. The mallard evaluation area included a 100 meter band of upland nesting habitat adjacent to the edge of wetlands.

## METHODS

### SELECTION OF TARGET SPECIES AND MITIGATION GOALS

Construction of Minidoka Dam and Reservoir resulted in a total loss of 10,503 HU's for four target wildlife species, and a total gain of 5,129 HU's for four other target wildlife species. The interagency work group used the equal replacement (equal trade-off) compensation method (USFWS 1980b) to credit benefits to target species. This method, which weights the value of each target species equally, was preferred over methods that require making value judgments between target species. With this method, combined HU benefits to mallards, redheads, western grebes, and marsh wrens replaced an equal number of combined HU losses to sage grouse, mule deer, river otters, and yellow warblers. This method resulted in a net loss of 5,374 HU's for an overall mitigation goal.

The interagency work group agreed that mitigation efforts should be focused on target species that were adversely affected in the Minidoka study area. Given that, the work group developed the following prioritized mitigation goals for Minidoka Dam:

<u>Target Species</u>	<u>Mitigation Goals (HU's)</u>
River otter	1,531
Sage grouse	1,922
Mule deer	1,746
Yellow warbler	<u>175</u>
Total	5,374

Throughout the Columbia River Basin and the entire United States, wetland (Brinson et al. 1981) and sagebrush-grassland (Braun et al. 1977) habitats have suffered significant declines in quantity and quality. The prioritized mitigation goals and objectives reflect interagency work group concerns about the loss of wetlands and sagebrush-grasslands, and conform with the Northwest Power Planning Council's Fish and Wildlife Program standards.

## ASSESSMENT OF MITIGATION PROJECT BENEFITS

### Habitat Evaluation Procedure

The HEP (see page 5) was used to estimate the benefits of proposed mitigation projects in terms of habitat units. For each target species expected to benefit from a mitigation project, the interagency team of biologists estimated the effect the project would have on the species Habitat Suitability Index. Species models, comprised of habitat variables, were used for guidance during HSI estimation. As much as possible, techniques to estimate HSI's and HU's were performed consistent with techniques used during the wildlife impact assessment.

### Mitigation Crediting

The method to predict wildlife benefits depended on whether existing habitat values were already protected. Wildlife benefits from protection and enhancement of private land and Idaho Department of Lands property were estimated to be the total HU's that would be provided by the parcels after protection (acquiring fee-titles or conservation easements from willing sellers) and enhancement (management actions). Wildlife benefits from enhancement actions on lands administered by the USBLM, USFWS, or USBR were estimated to be the increase of HU's provided on the project areas as a result of management actions.

Mitigation credit for protection/enhancement projects has been estimated as if it will occur as soon as projects are implemented. However, benefits may not occur for several years until habitats improve and wildlife increase their use of the enhanced areas. These methods and the accounting methods in the wildlife impact assessment were used instead of the technique of annualizing (USFWS 1980a). These simplified methods have resulted in liberal estimates of mitigation project benefits.

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## ASSESSMENT OF MITIGATION PROJECT COSTS

### Advance Design

Advance design is expected to include determining local habitat needs for the target species, identifying potential mitigation lands and contacting landowners, assessing easement opportunities and developing easement terms, evaluating potential wildlife benefits, ranking key parcels, obtaining appraisals and title searches, surveying available properties, obtaining purchase options, identifying protection or enhancement practices to be used, identifying NEPA requirements, refining mitigation cost estimate alternatives including operation and maintenance and monitoring, conducting and documenting public review process in local areas, refining monitoring methods, and assessing possibility of partnerships for habitat acquisition. Costs are based on estimates provided by biologists, engineers, and other professionals.

### Implementation

Implementation is expected to include acquiring fee-titles and/or easements, preparing site-specific management plans, conducting baseline HEP's, and designing and implementing habitat enhancement practices. Acquisition cost estimates include appraisal, legal, and realty fees. A new Idaho Conservation Easement law was passed in 1988, providing the legal mechanism for private landowners to create conservation easements on their property. The costs of acquiring conservation easements from willing sellers of private parcels is expected to be similar to actual fee-title acquisition of the same parcels. Enhancement costs will be for actions to initially improve wildlife habitat, such as building dikes and islands, planting vegetation, and fencing. "Enhancement" in the context of this plan is a means of accomplishing mitigation goals. Implementation costs are based on estimates provided by biologists and/or engineers. Costs of riparian improvements for river otter enhancement are estimates in the Columbia Basin System Planning Preliminary System Analysis Report (1989).

### Operation and Maintenance

These are recurring annual activities necessary to achieve and sustain a project's estimated benefits to wildlife. These efforts are necessary for projects to continue providing wildlife benefits, thereby protecting ratepayers' investments in mitigation. Section 1003 (b) (7) of the Northwest Power Planning Council's Wildlife Mitigation Rule requires that Bonneville Power Administration fund operation and maintenance needs. Operation and maintenance includes work such as fence maintenance, weed control, instream and riparian structure maintenance, replanting, grazing management to maintain desired wildlife habitat conditions, and associated labor and travel. Costs are based on estimates provided by biologists. Riparian maintenance costs are estimates in the Columbia Basin System Planning Preliminary System Analysis Report (1989). Operation and maintenance cost estimates for lands to be acquired from willing sellers includes a \$2.70 per acre fee in lieu of taxes. This is the average tax assessment for lands owned by IDFG (Wise and O'Laughlin 1990).

## Monitoring

This is the periodic inventory and monitoring of all mitigation lands. These efforts are necessary for projects to continue providing wildlife benefits, thereby protecting ratepayers' investments in mitigation. Section 1003 (c) of the Northwest Power Planning Council's Wildlife Mitigation Rule requires that Bonneville Power Administration develop, in consultation with the Council, the Fish and Wildlife agencies and tribes, utilities, and other interested parties, a comprehensive program to monitor and evaluate the effectiveness of the wildlife program. Wildlife habitat monitoring consists of repeatedly measuring habitat or population variables to infer changes in capability of the land to support wildlife (Cooperrider et al. 1986). After protection and/or enhancement activities, habitat features required by target species will be measured periodically to assess changes in habitat values and the effectiveness of the mitigation measures. Habitat monitoring will be accompanied by population measurements to confirm habitat/population relationships. Using adaptive management, mitigation techniques will be changed if monitoring indicates that the desired mitigation results are not being obtained. Biologists provided monitoring cost estimates.

## RESULTS AND DISCUSSION

### MITIGATION GOALS/TARGET SPECIES MANAGEMENT GOALS

The following mitigation goals complement national, state, tribal, regional, and/or local management plans and goals to protect and enhance remaining wetland and sagebrush-grassland habitats. The mitigation goals are consistent with Fish and Wildlife Program standards.

<u>Target Species</u>	<u>Mitigation Goals (HU's)</u>
River otter	1,531
Sage grouse	1,922
Mule deer	1,746
Yellow warbler	175
Total	5,374

The mitigation goals are also consistent with the following mitigation policies of the Idaho Department of Fish and Game (IDFG 1990).

Whenever unavoidable fish and wildlife habitat or population losses occur, the Department will, where practical and legally possible, actively seek compensation under the following guidelines:

- For long-term losses caused by habitat elimination or degradation, compensation by acquisition and improvement of alternate habitat will be sought rather than monetary restitution. Compensation must be permanent and include funding necessary for annual operations, maintenance, and monitoring if these are required to ensure that target goals for fish and wildlife benefits are achieved.
- Monetary restitution, based on costs to replace lost resources, will be sought for losses caused by direct mortality if replacement of animals is not feasible.
- Whenever possible, replacement of losses will be by the same fish and wildlife species or by habitat capable of producing the same species that suffered the loss, and compensation programs will be located in the immediate area of loss.
- Off-site locations and different species may be substituted in compensation programs if "on-site" and "in-kind" compensation is not possible.
- Compensation levels will be based on loss of habitat and loss of potential for wildlife production and recreation rather than numbers of animals or days of use of animals occurring at the time of loss.
- In jointly funded projects requiring fish and wildlife mitigation, participating entities will share mitigation credit proportional to their contribution.



### River Otter Plans, Goals, and Objectives

The river otter is closely associated with healthy riverine systems and riparian habitats in Idaho. River otter trapping seasons were closed in Idaho in 1971, due to declining populations. Since then, populations have increased, along with public appreciation of the nonconsumptive value of river otters.

A statewide policy of the IDFG is to advocate land management practices that protect, restore, and enhance fish and wildlife habitat, especially habitats such as wetlands and riparian areas that benefit a wide variety of fish and wildlife species (IDFG 1990).

IDFG statewide goals for the river otter include: 1) maintain river otter populations and distribution in currently occupied habitat, 2) continue to encourage the nonconsumptive enjoyment of river otters, 3) improve the database on river otter populations, and 4) expand river otter distribution into suitable but currently vacant habitat (Leptich et al. 1990).

IDFG issues and strategies include: 1) the Department recognizes that valuable furbearer habitat has been inundated, and associated wildlife populations have been lost, because of hydroelectric projects in Idaho, and 2) The Department will seek funding for full mitigation for the loss of furbearer habitat and associated furbearer populations from the Bonneville Power Administration under the Columbia Basin Fish and Wildlife Program, and other hydropower developers and responsible project operators under other programs (Leptich et al. 1990).

The USBLM classifies the river otter as a "sensitive" species. A USBLM national riparian goal stated in "Fish and Wildlife 2000, a Plan for the Future" is to manage riparian areas to achieve a healthy and productive condition for long-term benefits and values, in concert with the range and watershed programs.

Protecting and/or enhancing riparian habitat to provide benefits of 1,531 river otter HU's will complement river otter and riparian management direction and needs in Idaho.

### Sage Grouse Plans, Goals, and Objectives

The sage grouse is closely associated with sagebrush-grassland habitat in southern Idaho. Sage grouse often migrate many miles from summer range to winter range (Dalke et al. 1963, Connelly et al. 1988). Once on winter range, they depend on sagebrush for food and cover (Patterson 1952:198, Eng and Schladweiler 1972, Beck 1975, Wallestad 1975).

Extensive conversion of native habitat to irrigated agriculture has severely reduced numbers of sage grouse and other shrub-steppe associated species in the Minidoka project area. Range fires and conversion of native sagebrush lands to crested wheatgrass have also adversely affected sage grouse and other shrub-steppe associated species in the area. Based on the USFWS breeding bird survey data from 1980 to 1989, three of four bird species with significant population declines in Idaho are associated with shrub-steppe habitat (Saab 1991). These species include the Brewer's sparrow, vesper sparrow, and loggerhead shrike.

IDFG management direction for sage grouse (Smith et al. 1990) includes: 1) encourage protection and enhancement of sage grouse habitat, 2) upgrade databases on sage grouse seasonal distribution and abundance, and 3) increase sage grouse hunting opportunity.

IDFG issues and strategies include: 1) the Department recognizes that valuable upland game habitat has been inundated, and associated wildlife populations have been lost, because of hydroelectric projects in Idaho, and 2) the Department will seek funding for full mitigation for the loss of this habitat and associated wildlife populations from the Bonneville Power Administration under the Columbia Basin Fish and Wildlife Program, and other hydropower developers and responsible project operators under other programs (Smith et al. 1990).

A large portion of Idaho's sage grouse habitat now occurs on USBLM land, due in large part to agricultural development and sagebrush eradication on private lands. National goals of the USBLM as stated in "Fish and Wildlife 2000, A Plan for the Future" include: 1) ensure optimum populations and a national abundance and diversity of wildlife resources on public lands by restoring, maintaining, and enhancing habitat conditions through management plans and actions integrated with other uses of public lands through coordination with other programs, the states, by management initiatives, and through direct habitat improvement projects, and 2) ensure that big game/upland game species on the public lands are provided habitat of sufficient quantity and quality to sustain identifiable economic and/or social contributions to the American people.

Protecting and/or enhancing native sagebrush habitat to provide benefits of 1,922 sage grouse HUs will complement sage grouse management direction and needs in Idaho.

#### Mule Deer Plans, Goals, and Objectives

Winter range is a critical component of mule deer habitat. Mule deer winter habitat in most of southern Idaho is low elevation sagebrush-grassland range. Existing winter range in southern Idaho is threatened by development, sagebrush eradication, and wildfires. Many important parcels of winter range are currently in private ownership.

IDFG has several top priority mule deer programs. One of them includes the Department's recognition that valuable mule deer habitat has been inundated, and associated wildlife populations have been lost, because of hydroelectric projects in Idaho. The Department will seek funding for full mitigation for the loss of this habitat and associated wildlife from the Bonneville Power Administration under the Columbia Basin Fish and Wildlife Program, and from Idaho Power Company and other hydropower developers and responsible project operators under other programs (Scott et al. 1990).

USBLM national goals that relate to mule deer are the same as those listed under Sage Grouse Plans, Goals, and Objectives.

Protecting and/or enhancing native sagebrush habitat to provide benefits of 1,746 mule deer HUs will complement mule deer management direction and needs in Idaho.

### Yellow Warbler Plans, Goals, and Objectives

The yellow warbler is a common breeding bird in scrub-shrub habitat in Idaho. Preferred nesting habitats are wetland areas with abundant shrubs or small trees (Schroeder 1982).

The yellow warbler is closely tied to wetland habitat. Therefore, most management goals that pertain to wetland areas in Idaho affect yellow warblers. IDFG recognizes that: 1) the disappearance of wetlands is a serious problem for many nongame species, and 2) significant amounts of nongame wildlife habitat have been lost due to hydropower development and accompanying reservoirs. In recognition of these problems, the Department has developed strategies, including: 1) the Department is actively trying to acquire wetlands from monies generated by the state waterfowl stamp, and in association with other organizations such as Ducks Unlimited and The Nature Conservancy, and 2) the Department will seek funding for full mitigation for the loss of habitat and associated wildlife due to hydropower development. The funding will be sought from the Bonneville Power Administration under the Columbia Basin Fish and Wildlife Program, and from Idaho Power and other hydropower developers (Groves et al. 1990).

In response to past and continuing losses of scrub-shrub wetlands, the USFWS has identified this cover type as unique and scarce on a regional basis. The mitigation goal for these riparian wetlands, as defined in the USFWS mitigation policy, is no net loss of in-kind habitat values. The protection and enhancement of riparian wetlands is also consistent with goals of the Migratory Bird Treaty Act, the Emergency Wetland Protection Act of 1987, and Executive Order 11990 (Sather-Blair, USFWS, pers. commun.).

A national riparian goal of the USBLM, which relates to yellow warbler habitat quantity and quality, is listed under River Otter Plans, Goals, and Objectives.

Protecting and/or enhancing scrub-shrub wetland habitat to provide benefits of 175 yellow warbler HUs will complement riparian wetland management goals in Idaho.

## MITIGATION GOALS/FISH AND WILDLIFE PROGRAM STANDARDS

The Northwest Power Planning Council's Wildlife Mitigation Rule includes a list of standards, which mitigation goals and proposals will be measured against before implementation. Those standards are listed here, along with their relationship to mitigation goals.

- (A) Complement the activities of the region's state and federal wildlife agencies and Indian tribes.

All four mitigation goals to be implemented by federal and state agencies and/or tribes complement the activities of the IDFG, USBR, USBLM, USFWS, and Shoshone-Bannock Tribes, as explained in species plans, goals, and objectives sections.

- (B) Be the least costly way to achieve the biological objective.

Protection and/or enhancement of wetlands and native sagebrush-grassland areas appears to be the least costly way to achieve the biological objectives of the mitigation goals. All alternatives will be examined for cost-effectiveness during advance design.

- (C) Protect or enhance special habitat or species that would not be available unless prompt action is taken.

Sagebrush-grassland habitat in south central Idaho has been severely reduced in the past. It continues to be lost as a result of fires and eradication for grazing and agricultural purposes. Sagebrush-grasslands provide critical winter habitat for sage grouse, big game, and many other species. Privately owned sagebrush areas are in jeopardy, and prompt action is necessary to protect and enhance this diminishing resource.

As a result of past and continuing losses, wetland and free-flowing river habitats are very scarce in Idaho. Much of the remaining habitat is either in poor condition, or in good condition but threatened. High quality riparian/river habitat supports the highest species diversity of any habitat in Idaho. Prompt action is necessary to protect and enhance important remaining areas.

- (D) Encourage the formation of partnerships with other persons or entities, which would reduce project costs, increase benefits, and/or eliminate duplicative activities.

The potential for partnerships in the implementation of all four mitigation goals will be explored during advance design.

- (E) Have measurable objectives, such as the restoration of a given number of habitat units.

All four mitigation goals have measurable objectives, in terms of habitat units.

- (F) Not impose on Bonneville the funding responsibilities of others, as prohibited by section 4(h)(10)(A) of the Northwest Power Act.

None of the mitigation goals impose funding responsibilities of others on Bonneville.

- (G) Address special wildlife losses in areas that formerly had salmon and steelhead runs that were eliminated by hydroelectric projects (for example, societal and tribal wildlife losses).

The Minidoka study area did not formerly have salmon and steelhead runs.

- (H) Protect high quality, native, or other habitat or species of special concern, whether at the project site or not, including endangered, threatened, or sensitive species.

Implementing the mitigation goals will protect high quality native sagebrush-grasslands and wetlands. Special wildlife species expected to be benefited include the river otter (federal sensitive species), peregrine falcon (endangered species), ferruginous hawk (federal sensitive species and state species of special concern), Swainson's hawk (federal sensitive species), bald eagle (endangered species), trumpeter swan (federal sensitive species and state species of special concern), yellow-billed cuckoo (state species of special concern), long-billed curlew (federal sensitive species), black-crowned night-heron, black tern, and Forster's tern, in addition to many other wildlife species.

- (I) Provide riparian or other habitat that may benefit both fish and wildlife.

Implementing river otter and yellow warbler projects will improve water quality, benefit fish, and benefit a variety of riparian dependent wildlife species.

- (J) Address concerns over additions to public land ownership and impacts on local communities, such as reduction or loss of local government tax base, special district tax base, or the local economic base; or consistency with local governments' comprehensive plans.

These concerns will be addressed during advance design for all four mitigation goals. In 1990, Idaho passed a constitutional amendment that allows IDFG to make payments in lieu of taxes on Department-owned land.

- (K) Use publicly-owned land for mitigation, or management agreements on private land, in preference to acquisition of private land, while providing permanent protection or enhancement of wildlife habitat in the most cost-effective manner.

The mitigation goals are consistent with this standard. The intent of each goal is to provide permanent, cost-effective mitigation.

- (L) Mitigate losses in-place, in-kind, where practical. When a wildlife measure is not directly related to a hydroelectric-caused loss, the habitat units protected, mitigated, or enhanced by the measure will be credited against mitigation due for one or more hydroelectric projects, including power-related storage or regulatory dams (The Columbia Basin Fish and Wildlife Authority defines "in-place" as mitigation that takes place on lands close enough to the site where losses occurred so that people who would have used the diminished resource can reasonably expect to routinely use the replacement resources. The Authority defines "in-kind" as replacement of losses with the same type of habitat or replacement of species from the same guild).

Implementing projects to achieve each goal will provide in-place and in-kind mitigation.

- (M) Help protect or enhance natural ecosystems and species diversity over the long term.

Implementing the mitigation goals will help protect and enhance species diversity in either native sagebrush-grassland areas or riparian wetlands.

- (N) Based on best available scientific information.

The mitigation goals are based on the best scientific information that the interagency work group has available.

## MITIGATION PROPOSALS

The following proposals are the mitigation options preferred by the interagency technical work group. They are listed in priority order.

Riparian/river protection/enhancement. The goals for riparian mitigation are to protect and/or enhance 1,531 river otter HU's and 175 yellow warbler HU's. The recommended proposal to accomplish these goals is to protect and enhance existing or potential river otter and yellow warbler habitat along the Snake River and/or tributaries. Proposed mitigation areas either support otters and are threatened by development or provide potential otter habitat and are heavily grazed, farmed, or threatened by development.

There is little publicly-owned riparian habitat in the area. Therefore, a combination of public land enhancement and private land protection will be necessary. Habitat will be protected by acquiring conservation easements or fee-titles from willing sellers. Necessary enhancements include shoreline structures, vegetation plantings, fencing, and grazing management (Clary and Webster 1989, Columbia Basin System Planning PSAR 1989, Chaney 1990, Kusler 1990), and possibly otter and/or beaver introductions. Annual operation and maintenance of enhancements will be needed to sustain their benefits to wildlife. This proposal is consistent with the IDFG furbearer and nongame management plans, USBLM "Fish and Wildlife 2000" riparian management goals, and USFWS wetland goals and policies.

The preferred areas to protect and enhance for riparian mitigation, in priority order, are McTucker Island, Shoshone Creek, Little Wood River, Big Wood River, Big Cottonwood Creek, Hagerman desert aquatic sites, Devil's Corral desert aquatic site, Camas Creek, Clover Creek, Rock Creek (Twin Falls County), Huft Creek wet meadow, Rock Creek (Blaine County), Salmon Falls Creek, Little Goose Creek, and Frenchman's Island (Figure 2 in mitigation summary section).

**Benefits:** In order to meet a combined mitigation goal of 1,706 HU's for the otter (1,531 HU's) and yellow warbler (175 HU's), the interagency work group estimated that 1,880 acres of habitat would need to be protected and enhanced. This would provide benefits of an estimated 1,251 otter HU's and 455 yellow warbler HU's. Otters will benefit from protection of habitat, enhancement of riparian cover, and placement of den structures beside streams. Yellow warblers will benefit from protection and enhancement of scrub-shrub wetland habitat. Other species that will benefit include the peregrine falcon (endangered species), Swainson's hawk (federal sensitive species), bald eagle (endangered species), trumpeter swan (federal sensitive species and state species of special concern), yellow-billed cuckoo (state species of special concern), black tern, Forster's tern, black-crowned night-heron, possibly the mule deer, and many other species dependent on riparian habitat.

**Costs:** Acquiring easements or fee-titles from willing sellers (and associated appraisal, legal, and realty fees) is estimated to cost \$754,000. Other implementation costs include \$960,000 (\$16,000 per mile) for riparian improvements (vegetation plantings, fencing, otter den structures, etc.); \$110,000 for site-specific management plans, baseline habitat evaluations, and enhancement designs; and \$50,000 for otter and/or beaver introductions.

Operation and maintenance of riparian habitat improvements is estimated to cost \$760 per mile per year, for 61.5 miles of stream and/or island habitat. An estimated \$4,000 per year will be needed for fees in lieu of taxes.

Advance design	190,000
Implementation	<u>1,874,000</u>
Total initial costs	\$2,064,000
Operation and maintenance	51,000
Monitoring	<u>14,000</u>
Total annual costs	\$65,000



Shrub-steppe protection - South Hills. The goals for sagebrush-grassland mitigation are to protect and/or enhance 1,922 sage grouse HU's and 1,746 mule deer HU's. The following proposal is to acquire conservation easements or fee-titles from willing sellers in the South Hills area. Wildlife habitat on private land in this area is threatened by increased grazing pressure, sagebrush eradication to increase livestock forage, and other potential impacts. Presently, the area provides high-quality sage grouse and mule deer habitat. The area receives relatively high precipitation, and wildfires are rare.

Proposed enhancements to improve and maintain habitat quality include small amounts of shrub planting, fencing, and greenstripping (Rosentreter and Jorgensen 1986, Mangan et al. 1987). Annual operation and maintenance will be necessary to sustain benefits to wildlife. This proposal is consistent with the IDFG upland game, big game, and nongame management plans, and USBLM "Fish and Wildlife 2000" habitat goals.

**Benefits:** In order to meet a combined mitigation goal of 3,668 HU's for sage grouse (1,922 HU's) and mule deer (1,746 HU's), the interagency work group estimated that 2,445 acres would need to be protected and enhanced in the South Hills area. This would provide benefits of an estimated 2,200 sage grouse HU's and 1,468 mule deer HU's. Sage grouse and mule deer will benefit from protection and enhancement of sagebrush-grassland habitat, which is critical for food and cover. Other species that will benefit include the Swainson's hawk (federal sensitive species), ferruginous hawk (federal sensitive species and state species of special concern), and many other species dependent on sagebrush-grassland habitat, including the Brewer's sparrow, vesper sparrow, and loggerhead shrike.

**Costs:** Acquiring easements or fee-titles from willing sellers and associated appraisal, legal, and realty fees is estimated to cost \$425,000. Other implementation costs include 18 miles of fencing at \$6,000 per mile; 200 acres of shrub plantings at \$325 per acre; greenstripping or other methods, at \$60 per acre, to reduce the possibility of fire ignition along 6 miles of road; and \$60,000 for site-specific management plans, baseline habitat evaluations, and enhancement designs. Operation and maintenance needs include fence maintenance, weed control, and possibly replanting and grazing management. An estimated \$7,000 per year will be needed for fees in lieu of taxes.

Advance design	100,000
Implementation	<u>669,000</u>
Total initial costs	\$769,000
Operation and maintenance	17,000
Monitoring	<u>7,000</u>
Total annual costs	\$24,000

## MITIGATION PLAN SUMMARY

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501) directs that measures be implemented to protect, mitigate, and enhance fish and wildlife to the extent affected by development and operation of hydropower projects in the Columbia River system. Under direction of this Act, the interagency work group has developed a wildlife mitigation plan (Table 3, Figure 2) for Minidoka Dam. Mitigation goals and options were designed and prioritized by the interagency work group, which used the wildlife impact assessment as a guideline, while considering the needs of wildlife, opportunities to protect and enhance wildlife in the area, and Fish and Wildlife Program mitigation standards. Implementation of this mitigation plan will provide benefits of an estimated 5,374 target species HUs (Table 4). This total is comprised of benefits to river otters, sage grouse, mule deer, and yellow warblers. Implementing this plan will also benefit many other wildlife species represented by the above target species. The initial cost of the mitigation plan is estimated to be \$2,833,000. Annual operation, maintenance, and monitoring costs are estimated to be \$89,000 (Table 5).

Projects complement management policies and goals of federal and state wildlife agencies and the Shoshone-Bannock Tribes. The mitigation plan will help alleviate regional problems associated with the continuing loss of free-flowing rivers and low-elevation sagebrush-grasslands.

Table 3. Minidoka Dam prioritized wildlife mitigation goals and preferred options.

Target species	Habitat impacts in Minidoka Dam study area	Mitigation goals	Preferred mitigation options
River otter	-2,993 HU's	1,531 HU's	Provide benefits of 1,706 river otter and yellow warbler HU's by protecting and enhancing riparian/river habitat in south central Idaho, preferably in the McTucker Island, Shoshone Creek, Little Wood River, Big Wood River, Big Cottonwood Creek, Hagerman, Devil's Corral, Camas Creek, Clover Creek, Rock Creek (Twin Falls County), Huft Creek, Rock Creek (Blaine County), Salmon Falls Creek, Little Goose Creek, or Frenchman's Island areas.
Sage grouse	-3,755 HU's	1,922 HU's	
Mule deer	-3,413 HU's	1,746 HU's	
Yellow warbler	-342 HU's	175 HU's	
Mallard	+174 HU's		
Redhead	+4,475 HU's		Provide benefits of 3,668 sage grouse and mule deer HU's by protecting and enhancing shrub-steppe (sagebrush-grassland) habitat, preferably in the South Hills area.
Western grebe	+273 HU's		
Marsh wren	+207 HU's		
Total	-5,374 HU's	5,374 HU's	

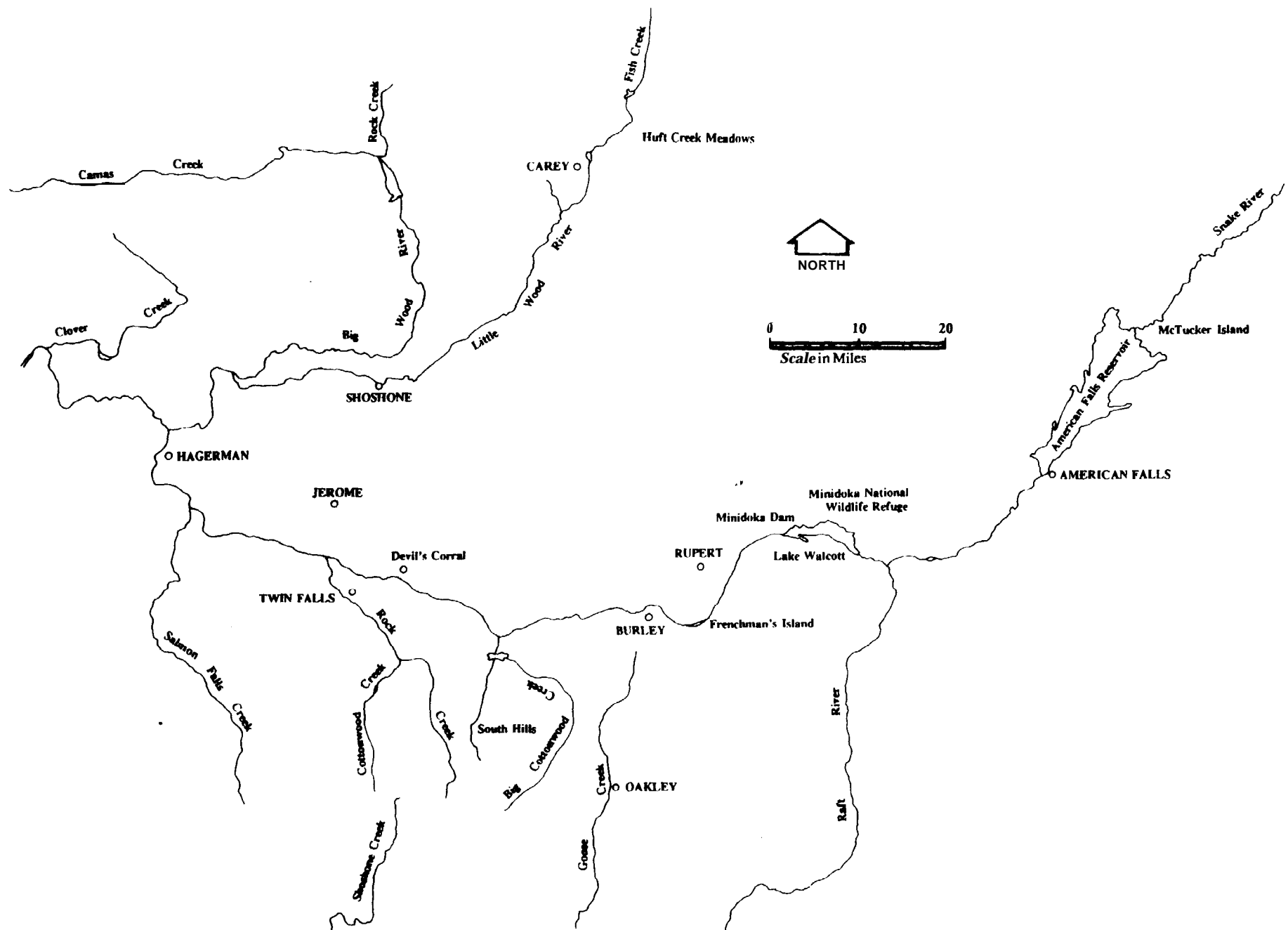


Fig. 2. Minidoka Dam 'proposed mitigation areas.

Table 4. Estimated benefits (habitat units) of Minidoka Dam mitigation proposals. Proposals are listed in order of priorities chosen by the interagency work group.

Proposal	Target species				Total
	River otter	Sage grouse	Mule deer	Yellow warbler	
Riparian/river protection/enhancement	1,251	0	0	455	1,706
Shrub-steppe protection - South Hills	0	2,200	1,468	0	3,668
Total	1,251	2,200	1,468	455	5,374
Mitigation goal	1,531	1,922	1,746	175	5,374
Impacts identified in loss assessment	-2,993	-3,755	-3,413	-342	

Table 5. Estimated costs of Minidoka Dam mitigation plan. Proposals are listed in order of priorities chosen by the interagency work group.

Proposal	Initial costs		Annual costs	
	Advance design	Implementation	Operation and maintenance	Monitoring
Riparian/river protection/enhancement	190,000	1,874,000	51,000	14,000
Shrub-steppe protection - South Hills	100,000	669,000	17,000	7,000
Total	<u>\$290,000</u>	<u>\$2,543,000</u>	<u>\$68,000</u>	<u>\$21,000</u>
Initial Costs	\$2,833,000			
Annual Costs			\$89,000	

## ALTERNATIVE MITIGATION OPTIONS

The following mitigation options are alternatives to the preferred proposals. They are listed in priority order.

Shrub-steppe enhancement - Minidoka National Wildlife Refuge. The following mitigation option is to enhance sage grouse and mule deer winter range on 1,352 acres of Minidoka National Wildlife Refuge. The proposal is to eliminate heavy livestock use from 511 acres by reducing the width of water lanes between USBLM grazing allotments and Minidoka Reservoir, and eliminate grazing from 841 acres by fencing about 10 miles of the Refuge boundary. An estimated 75% (1,014 acres) of these heavily impacted areas need shrub, forb, and perennial grass plantings. Thirteen miles of greenstrip is needed to reduce the probability of future wildfires. Annual operation and maintenance would be necessary to sustain benefits to wildlife. This proposal is consistent with USFWS Minidoka National Wildlife Refuge goals, and IDFG upland game, big game, and nongame management plans.

**Benefits:** The interagency work group estimated this project would provide benefits of 650 sage grouse HU's, 200 mule deer HU's, and 10 yellow warbler HU's. Enhancing this sagebrush-grassland habitat would benefit many other wildlife species, including the Swainson's hawk (federal sensitive species), ferruginous hawk (federal sensitive species and state species of special concern), and many other species dependent on sagebrush-grassland habitat.

**Costs:** Implementation cost estimates include \$80,000 for fencing 13.4 miles at \$6,000 per mile; \$581,000 for planting shrubs, forbs, and perennial grasses on 1,014 acres at \$573 per acre; and \$50,000 for site-specific management plans, baseline habitat evaluations, and enhancement designs. Operation and maintenance needs include fence maintenance, grazing control, and possibly replanting.

Advance design	40,000
Implementation	711,000
Total initial costs	\$751,000
Operation and maintenance	15,000
Monitoring	6,000
Total annual costs	\$21,000

Shrub-steppe enhancement - USBLM lands. The goal for sagebrush-grassland mitigation is to protect and/or enhance 1,922 sage grouse HU's and 1,746 mule deer HU's. The following mitigation option is to enhance sage grouse and mule deer winter range on USBLM lands in the Burley District. The area targeted for range rehabilitation provided winter range prior to mid-1980's wildfires, which converted large acreages into annual grasslands dominated by cheatgrass. The area receives low precipitation, and wildfires are common.

This mitigation proposal is to re-establish shrubs, forbs, and perennial grasses in areas presently dominated by cheatgrass; and reduce the probability of further burning, by planting greenstrips around mitigation areas. Annual operation and maintenance would be necessary to sustain benefits to wildlife. This proposal is consistent with the IDFG upland game, big game, and nongame management plans, and USBLM "Fish and Wildlife 2000" habitat goals.

**Benefits:** In order to meet a combined mitigation goal of 3,668 HU's for sage grouse (1,922 HU's) and mule deer (1,746 HU's), the interagency work group estimated that 3,335 acres of USBLM land would need to be enhanced. This would provide benefits of an estimated 3,000 sage grouse HU's and 668 mule deer HU's. Other species that would benefit include the Swainson's hawk (federal sensitive species), ferruginous hawk (federal sensitive species and state species of special concern), long-billed curlew (federal sensitive species), and many other species dependent on sagebrush-grassland habitat.

**Costs:** Re-establishing shrubs, forbs, and perennial grasses is estimated to cost \$573 per acre. This is based on average costs per acre of \$10 for site preparation, \$10 for shrub seed and aerial seeding, \$100 for grass and forb seed, \$20 for planting grasses and forbs, \$75 for sagebrush seedlings, \$25 for seedlings of other shrubs, \$250 to plant sagebrush, and \$83 to plant other shrubs. Greenstripping to reduce the probability of future wildfires is estimated to cost \$60 per acre, with 1 acre of greenstrip needed per 9.3 acres of plantings. Implementation costs also include \$100,000 for site-specific management plans, baseline habitat evaluations, and enhancement designs. To maintain the estimated benefits of this project over time, the work group estimated that rehabilitation efforts would have to be re-done about every 20 years. This cost is annualized and included in operation and maintenance costs. Other operation and maintenance needs include fence maintenance, weed control, and possibly grazing management.

Advance design	100,00
Implementation	2,032,000
Total initial costs	\$2,132,000
Operation and maintenance	105,000
Monitoring	10,000
Total annual costs	\$115,000



Shrub-steppe protection - adjacent to Minidoka National Wildlife Refuge. The following mitigation option is to protect sage grouse and mule deer winter range on 441 acres of state endowment lands adjacent to Minidoka National Wildlife Refuge. Currently, the area is being grazed or farmed. Wildlife habitat on the targeted state parcels is threatened by increased grazing, conversion to agriculture, or other development. Habitat could be protected by acquiring other land of equal value and developing a use-trade agreement or land exchange with the Idaho Department of Lands (IDL), or possibly by compensating IDL for lost revenues.

Proposed enhancements to improve and maintain habitat quality include planting shrubs, forbs, and perennial grasses on 75% (331 acres) of the area that would be protected; and planting 6 miles of greenstrip to reduce the probability of future wildfires. Annual operation and maintenance would be necessary to sustain benefits to wildlife. This proposal is consistent with IDFG upland game, big game, and nongame management plans, and USFWS Minidoka National Wildlife Refuge goals.

**Benefits:** The interagency work group estimated this project would provide benefits of 400 sage grouse HU's, 175 mule deer HU's, and 2 yellow warbler HU's. Protecting and enhancing this sagebrush-grassland habitat would benefit many other wildlife species, including the Swainson's hawk (federal sensitive species), ferruginous hawk (federal sensitive species and state species of special concern), and many other species dependent on sagebrush-grassland habitat.

**Costs:** Protecting 441 acres is estimated to cost \$244,000. Planting shrubs, forbs, and perennial grasses on 331 acres is estimated to cost \$573 per acre. Six miles of greenstrip is estimated to cost \$60 per acre for 175 acres. Implementation costs also include \$60,000 for site-specific management plans, baseline habitat evaluations, and enhancement designs. Operation and maintenance needs include fence maintenance, weed control, and possibly replanting and grazing management.

Advance design	40,000
Implementation	<u>505,000</u>
Total initial costs	\$545,000
Operation and maintenance	5,000
Monitoring	<u>3,000</u>
Total annual costs	\$8,000

## MITIGATION OPTIONS/FISH AND WILDLIFE PROGRAM STANDARDS

The Northwest Power Planning Council's Wildlife Mitigation Rule includes a list of standards, which mitigation goals and proposals will be measured against before implementation. Those standards are listed here, along with their relationship to identified mitigation proposals.

- (A) Complement the activities of the region's state and federal wildlife agencies and Indian tribes.

The mitigation proposals and alternatives to be implemented by federal and state agencies and/or tribes complement the activities of the IDFG, USBR, USBLM, USFWS, and Shoshone-Bannock Tribes, as explained in species plans, goals, and objectives sections.

- (B) Be the least costly way to achieve the biological objective.

The preferred mitigation proposals appear to be the least costly way to achieve the biological objectives of the mitigation goals. All alternatives will be further examined for cost-effectiveness during advance design.

- (C) Protect or enhance special habitat or species that would not be available unless prompt action is taken.

Sagebrush-grassland habitat in south central Idaho has been severely reduced in the past. It continues to be lost as a result of fires and eradication for grazing and agricultural purposes. Sagebrush-grasslands provide critical winter habitat for sage grouse, big game, and many other species. Privately owned sagebrush areas are in jeopardy, and prompt action is necessary to protect and enhance this diminishing resource.

As a result of past and continuing losses, wetland and free-flowing river habitats are very scarce in Idaho. Much of the remaining habitat is either in poor condition, or in good condition but threatened. High quality riparian/river habitat supports the highest species diversity of any habitat in Idaho. Prompt action is necessary to protect and enhance important remaining areas.

- (D) Encourage the formation of partnerships with other persons or entities, which would reduce project costs, increase benefits, and/or eliminate duplicative activities.

The potential for partnerships in the implementation of all mitigation options will be explored during advance design.

- (E) Have measurable objectives, such as the restoration of a given number of habitat units.

All mitigation options have measurable objectives, in terms of habitat units.

- (F) Not impose on Bonneville the funding responsibilities of others, as prohibited by section 4(h)(10)(A) of the Northwest Power Act.

None of the mitigation options impose funding responsibilities of others on Bonneville.

- (G) Address special wildlife losses in areas that formerly had salmon and steelhead runs that were eliminated by hydroelectric projects (for example, societal and tribal wildlife losses).

The Minidoka study area did not formerly have salmon and steelhead runs.

- (H) Protect high-quality, native, or other habitat or species of special concern, whether at the project site or not, including endangered, threatened, or sensitive species.

Implementing the mitigation proposals will protect either high-quality native sagebrush-grasslands or wetlands. Special wildlife species expected to be benefited include the river otter (federal sensitive species), peregrine falcon (endangered species), ferruginous hawk (federal sensitive species and state species of special concern), Swainson's hawk (federal sensitive species), bald eagle (endangered species), trumpeter swan (federal sensitive species and state species of special concern), yellow-billed cuckoo (state species of special concern), long-billed curlew (federal sensitive species), black tern, and black-crowned night-heron, in addition to many other wildlife species.

- (I) Provide riparian or other habitat that may benefit both fish and wildlife.

Implementing the river otter and yellow warbler projects will improve water quality, benefit fish, and benefit a variety of riparian dependent wildlife species.

- (J) Address concerns over additions to public land ownership and impacts on local communities, such as reduction or loss of local government tax base, special district tax base, or the local economic base; or consistency with local governments' comprehensive plans.

These concerns will be addressed during advance design for all mitigation options. In 1990, Idaho passed a constitutional amendment that allows IDFG to make payments in lieu of taxes on Department-owned land.

- (K) Use publicly-owned land for mitigation, or management agreements on private land, in preference to acquisition of private land, while providing permanent protection or enhancement of wildlife habitat in the most cost-effective manner.

The mitigation options are consistent with this standard. The intent of each option is to provide permanent, cost-effective mitigation.

- (L) Mitigate losses in-place, in-kind, where practical. When a wildlife measure is not directly related to a hydroelectric-caused loss, the habitat units protected, mitigated, or enhanced by the measure will be credited against mitigation due for one or more hydroelectric projects, including power-related storage or regulatory dams (The Columbia Basin Fish and Wildlife Authority defines "in-place" as mitigation that takes place on lands close enough to the site where losses occurred so that people who would have used the diminished resource can reasonably expect to routinely use the replacement resource. The Authority defines "in-kind" as replacement of losses with the same type of habitat or replacement of species from the same guild.).

Implementing the projects will provide in-place and in-kind mitigation.

- (M) Help protect or enhance natural ecosystems and species diversity over the long term.

Implementing the mitigation options will help protect and enhance species diversity in either native sagebrush-grassland areas or riparian wetlands.

- (N) Based on best available scientific information.

The mitigation options are based on the best scientific information that the interagency work group has available.

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## APPENDIX A

### MITIGATION TARGET SPECIES MODELS

#### Yellow Warbler Model

Schroeder (1982)

It is assumed that optimal habitats contain **100%** hydrophytic deciduous shrubs and that habitats with no hydrophytic shrubs will provide marginal suitability. Shrub densities between 60% and 80% crown cover are assumed to be optimal. As shrub densities approach zero cover, suitability also approaches zero. Totally closed shrub canopies are assumed to be of only moderate suitability, due to the probable restrictions on movement of the warblers in those conditions. Shrub heights of 2 meters (6.6 feet) or greater are assumed to be optimal, and suitability will decrease as heights decrease to zero.

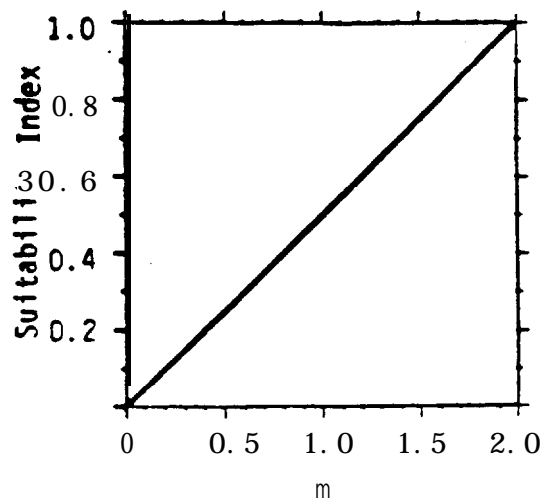
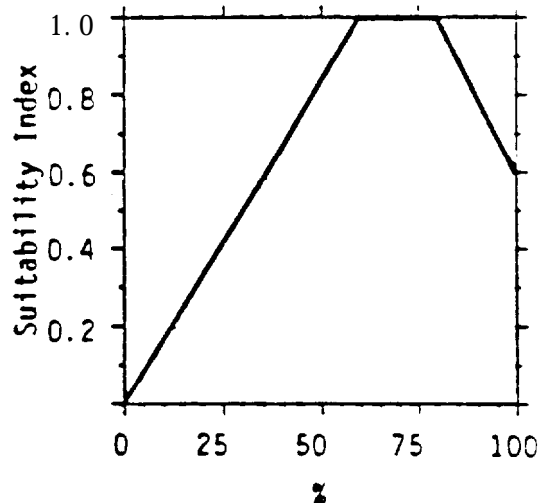
Each of these habitat variables exerts a major influence in determining overall habitat quality for the yellow warbler. A habitat must contain optimal levels of all variables to have maximum suitability. Low values of any one variable may be partially offset by higher values of the remaining variables. Habitats with low values for two or more variables will provide low overall suitability levels.

#### Variable

V<sub>1</sub>      Percent deciduous  
            shrub crown cover.

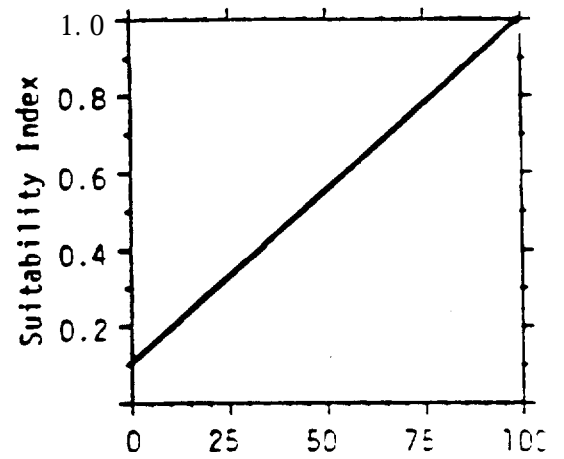
V<sub>2</sub>      Average height of  
            deciduous shrub  
            canopy.

#### Suitability Index Curve





$V_3$       Percent of deciduous  
shrub canopy comprised  
of hydrophytic shrubs.



<u>Life Requisite</u>	<u>Cover Type</u>	<u>Equation</u>
Reproduction	DSW	$(V_1 \times V_2 \times V_3)^{1/2}$

HSI determination. The HSI value for the yellow warbler is equal to the reproduction value.

## River Otter Model

Adapted from Ament (1984) and USFWS (1984)

River otters require large amounts of cover, and long stretches of river devoid of vegetation may hinder otter movement. Few otters are found in areas of sparse vegetation. It is assumed that otters require a minimum of 25% vegetation and rock cover in riparian areas, habitat quality is optimal when shoreline cover is between 75% and 90%, and extremely dense cover (>90%) restricts movements.

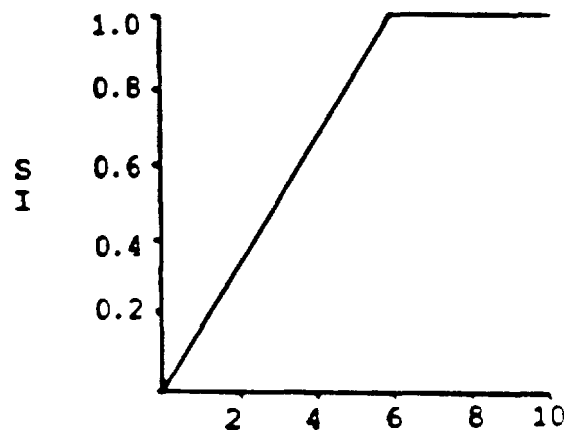
Otters do not excavate their own dens, but rather use dens dug by other animals or natural shelters such as log jams and rock piles (Toweill and Tabor 1982). It is assumed that habitat quality is optimal when potential den sites exceed 6 per kilometer of river.

A reproduction component index was developed that assumes reproduction habitat quality depends on den site availability ( $V_1$ ) and shoreline cover ( $V_2$ ). The suggested model is  $(V_1 \times V_2)^{1/2}$ .

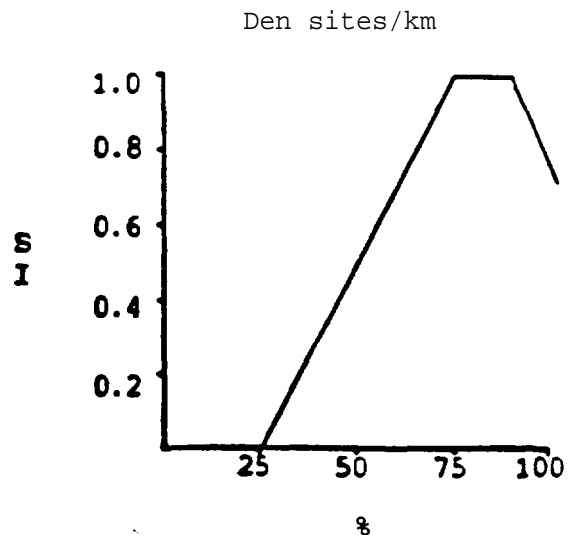
### Variable

$V_1$       Number of potential  
             den sites.

### Suitability Index Curve



$V_2$       Percent of vegetation  
             and rock cover along  
             shoreline.



### Mule Deer Model

Browse often furnishes 75% or more of the mule deer's winter diet. The availability of adequate browse is often the limiting factor for mule deer populations over much of their range (Schneegas and Bumstead 1977). Forbs and grasses are supplemental winter foods and their availability will result in an increased food value for mule deer. Quantity and quality of nutritious forage in the spring has a major effect on mule deer production and survival (Wallmo et al. 1977).

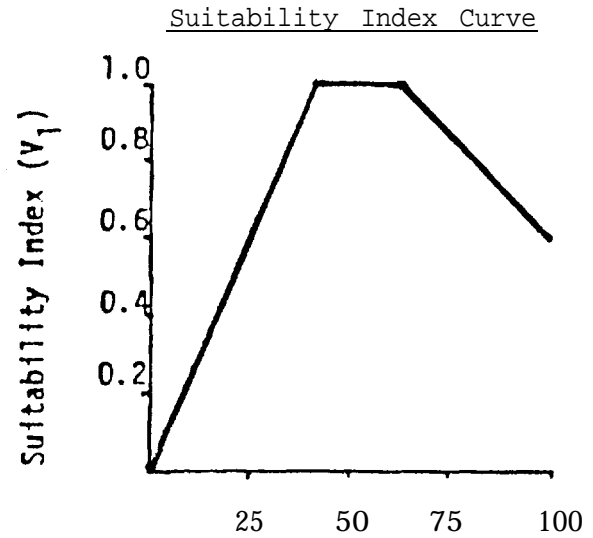
Winter food value in all cover types is assumed to be a function of shrub canopy cover ( $V_1$ ), preferred shrub canopy cover ( $V_2$ ), and herbaceous canopy cover ( $V_3$ ).  $V_1$  and  $V_2$  are interactive variables and compensations exist between them. The abundance of shrubs and the availability of preferred shrubs are the most important components of the food value for winter range and have been weighted accordingly. The suggested function is:

$$[3(V_1 \times V_2)^{1/2} + V_3]/4*$$

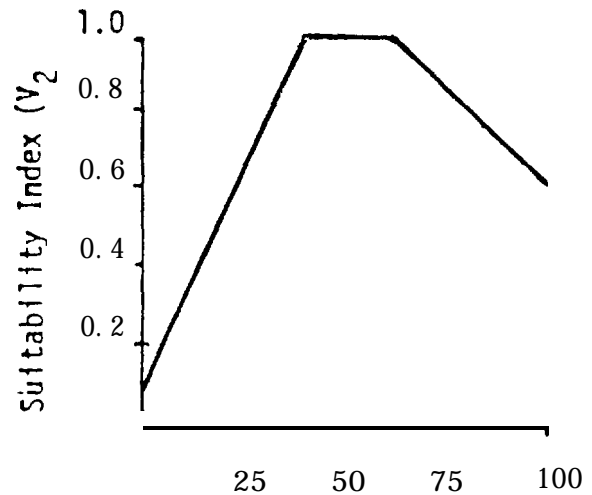
\* When evaluating food on winter range the average snow conditions for the area must be taken into consideration. If the average depth of snow on the ground exceeds 24 inches for extended periods of time, the life requisite value should be adjusted downward. In determining winter snow conditions, consider snowfall records, slope, aspect, wind, and vegetation cover.

Variable

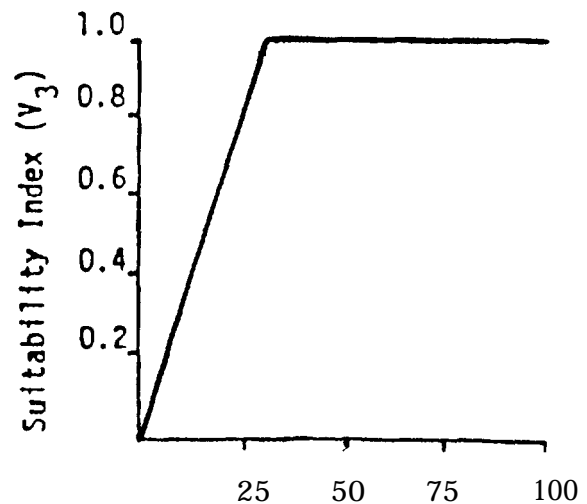
V<sub>1</sub>      Percent shrub crown cover <1.5 meters (5 feet) in height (do not consider small conifers as shrubs).



V<sub>2</sub>      Percent shrub crown cover of preferred shrubs (1.5 meters (5 feet) in height (preferred shrubs include, but are not limited to: antelope bitterbrush, mountain mahogany, ceanothus, chokecherry, serviceberry, and willow)).



V<sub>3</sub>      Percent herbaceous canopy cover.



# Sage Grouse Model (Wintering)

Adapted from **McCollough**, USFWS, unpubl. model

Sage grouse of the Snake River Plain often migrate many miles from summer range to winter range (**Dalke** et al. 1963, **Connelly** et al. 1988). Once on winter range, sage grouse depend on sagebrush for food and cover (**Patterson 1952:198**, **Eng** and **Schladweiler 1972**, **Beck 1975**, **Wallestad 1975**).

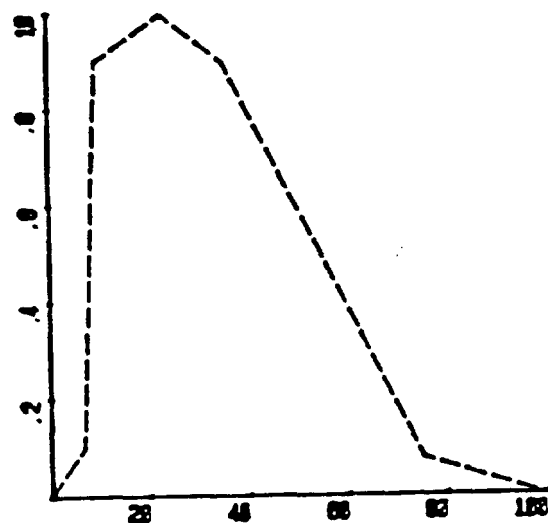
A model was developed that assumes winter habitat quality depends on sagebrush canopy cover ( $V_1$ ) and height of sagebrush above snow ( $V_2$ ). The suggested model is  $(V_1 \times V_2)^{1/2}$ .

## Variable

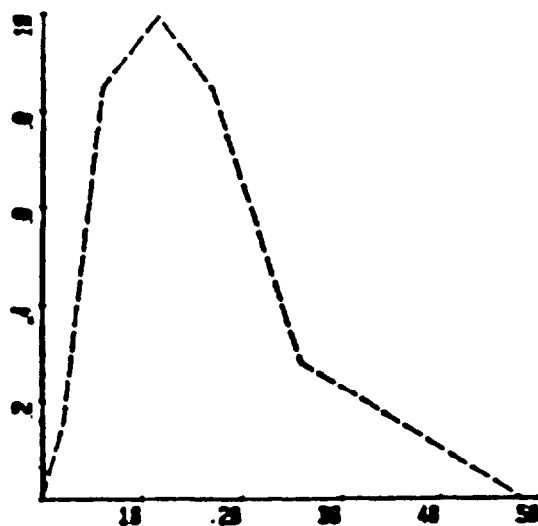
$V_1$  Sagebrush canopy cover.

$V_2$  Height of sagebrush above snow.

## Suitability Index Curve



% SAGEBRUSH CANOPY COVER



AVE. SAGEBRUSH HT (IN)

## APPENDIX B

### PUBLIC INVOLVEMENT CERTIFICATION

A consultation/coordination meeting (public hearing) was held on April 24, 1990 to discuss the project scope, objectives and direction, products, and duration. A second public hearing was held on March 20, 1991 to discuss results presented in the draft report. Minutes of both hearings are included in this appendix.

Press releases announcing both public meetings were carried in three local newspapers in the Twin Falls and Burley/Rupert areas. Press releases for the March 20, 1991 meeting were first published four weeks before the meeting. They announced the meeting location, date, and purpose. They stated that the draft report was available and oral and written comments were being accepted. The same press releases were published again one week before the hearing.

Personal letters announcing the public hearings and availability of the draft report were mailed to 13 agency and tribal representatives, 17 utility representatives, 20 conservation groups, 12 county commissioners, two mayors, and ten additional members of the public. Copies of the draft report were included in the above mailing to interested/involved parties, including 12 agency and tribal representatives (USBR, USFWS, USBLM, IDFG, NWPPC, BPA, and Shoshone-Bannock Tribes), two utility representatives (PNUCC, Idaho Power Company), three conservation groups (The Nature Conservancy, Mini-Cassia Sportsmen's Club, and Pheasants Forever), one Minidoka County Commissioner, and seven additional members of the public.

**Minutes of Minidoka Dam and Reservoir  
Wildlife Mitigation Planning  
Public Meeting**

**April 24, 1990  
Rupert , Idaho**

A total of 22 people attended the public meeting in Rupert, including four Idaho Department of Fish and Game personnel.

Wildlife mitigation requirements under the 1980 Northwest Power Planning Act and the Northwest Power Council's recently published Wildlife Mitigation Rule were reviewed and discussed by the meeting participants. Idaho Fish and Game personnel presented a slide show which illustrated methods and results of the Minidoka Wildlife **Impact Assessment**. Participants of the meeting then reviewed the scope, **objectives**, products, coordination activities, and duration of the Minidoka wildlife mitigation planning process. Potential target wildlife species mitigation goals were discussed. Participants generally agreed that target species mitigation goals based on the proportion that each species contributed to the total net loss at Minidoka were suitable. These goals are:

<u>Target Species</u>	<u>Habitat Units to be Replaced</u>
River otter	1,531
Sage grouse	1,922
Mule deer	1,746
Yellow warbler	175
Total	5,374

Several questions and comments about the impact assessment and mitigation goals were discussed during the meeting. A summary of comments and responses follows.

Impact Assessment Comments

One participant felt that wetland losses were overstated, because the Snake River ran dry in some pre-construction years. Another participant wondered whether we had looked at the benefits of the wildlife refuge while another wanted to know why we had not examined fish impacts.

Impact Assessment Response

Pre-construction USBR maps from 1905 showed areas of scrub-shrub wetlands identified as "dense willows," and emergent wetlands identified as "wild meadow." Therefore, the interagency work group agreed that wetlands did occur in the pre-construction study area. The interagency work group did credit post-construction benefits of the wildlife refuge to wildlife. The work group didn't examine fish impacts because fish are covered under other Bonneville and Power Council programs.

### Mitigation Planning Comments

Participants had several questions and comments about mitigation planning and goals, including: How will mitigation funding be spent? How can you mitigate for big game? How abundant is cheatgrass in the Minidoka area? How far off-site will we go to mitigate Minidoka losses? Won't it be difficult to mitigate for river otters? What are river otters good for? Can we do something for wild turkeys?

### Mitigation Planning Response

Mitigation funding is expected to be spent in a variety of ways, including protecting important habitats through acquisition of fee-titles or easements from willing sellers, and enhancing protected habitats through various management activities. Big game habitat losses can be mitigated by protecting existing important big game habitat on private lands, and/or enhancing damaged big game habitat on those protected lands or on public lands. Cheatgrass has invaded many native southern Idaho ranges, and provides little or no benefit to wintering big game. The interagency work group hopes to design effective wildlife mitigation projects as close to the Minidoka project as possible, and not go off-site. Off-site is currently defined by the Columbia Basin Wildlife Committee as a distance further from the site of impact than it takes a person to get to in a one-day round-trip. River otter mitigation can be accomplished by protecting and enhancing certain riparian wetland areas where river otters now exist or can exist in the future. River otter (riparian) enhancement will benefit a large variety of wildlife, including wild turkeys among other species. River otters are a good indicator of a healthy stream system. They are important to people for aesthetic, cultural, and many other reasons.



**Minutes of Minidoka Dam and Reservoir  
Wildlife Mitigation Planning  
Public Meeting**

**March 20, 1991  
Rupert, Idaho**

A total of 14 people attended the public meeting in Rupert, including four Idaho Department of Fish and Game personnel.

After introductions, we reviewed the wildlife mitigation program to date. We discussed the Minidoka Dam wildlife impact assessment and summarized the net impacts. We reviewed agency and public coordination conducted during the planning process. Then, we discussed the interagency team's mitigation goals and preferred mitigation options to address the goals.

Those in attendance at the hearing were generally in favor of the mitigation proposals. There was some disagreement on whether mitigation is needed when there is more mileage of shoreline at Minidoka Reservoir now than was present before the dam. We discussed the methods used during impact assessment to quantify cover type acreages and target species habitat quality. We discussed the fact that four aquatic or riparian-dependent target species were estimated to have been benefited by Minidoka Dam, and mitigation goals accounted for those benefits. The principal impacts were inundation of more than 36 miles of free-flowing river and 7,700 acres of sagebrush-grasslands which provided habitat for many wildlife species, compared to a lake, which supports fewer species. We discussed the recent amending of the net losses into the fish and wildlife program, and the schedule for finalizing the mitigation plan.

## **APPENDIX C**

### **LETTERS OF COMMENT**



## IDAHO FISH & GAME

600 South Walnut / Box 25  
Boise, Idaho 83707

April 30, 1991

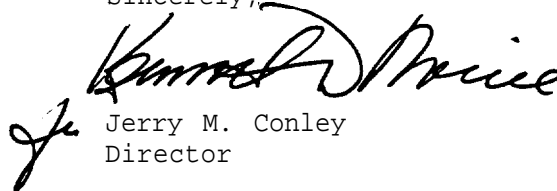
John Palensky, Director  
Division of Fish and Wildlife, PJS  
Bonneville Power Administration  
P.O. Box 3621  
Portland, OR 97208

Dear Mr. Palensky:

Enclosed is the Minidoka Dam Wildlife Protection, Mitigation, and Enhancement Plan. This planning effort was funded by the Bonneville Power Administration under section 1003(b)(4) of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program (as amended by the 1989 Wildlife Rule). This plan was prepared by the Idaho Department of Fish and Game in consultation and coordination with the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, Shoshone-Bannock Tribes, Northwest Power Planning Council, Bonneville Power Administration, Pacific Northwest Utilities Conference Committee, conservation groups, local government, and the public.

The Idaho Department of Fish and Game supports the contents of this plan. We encourage the Northwest Power Planning Council and Bonneville Power Administration to consider and implement this plan in a timely manner.

Sincerely,

  
Jerry M. Conley  
Director

JMC/RCM/sa

Enc.

Cecil D. **Andrus** / Governor  
Jerry M. Conley / Director



Working for wildlife since 1938



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Boise Field Station  
4696 Overland Road, Room 576  
Boise, Idaho 83705

April 10, 1991

Cal Groen  
Idaho Department of Fish and Game  
600 South Walnut  
Boise, Idaho 83707

Re: Draft Minidoka Dam Wildlife  
Mitigation Plan (1404.1500)

*cal*  
Dear Mr. Groen:

We have reviewed the referenced plan for Minidoka Dam, and believe that the work team made a solid analysis of the gains and losses to wildlife habitat resulting from the construction of Minidoka Dam. Your mitigation plan developed from this analysis targets crucial wildlife habitat and will focus efforts in the right directions. Riparian corridors in the arid west are often severely degraded, though they are critical habitats for many species of wildlife, and are necessary for the health of the rivers and streams themselves. Indeed, without healthy riparian vegetation, many streams have dried up. Protection and enhancement of wetland and riparian habitats are major priorities of our agency; the mitigation plan is in accord with these priorities.

Native, healthy sagebrush grasslands are also an important and declining resource in southern Idaho. This is owing not only to direct flooding by reservoirs, but also to irrigated agriculture made possible by dams, grazing "improvements" such as crested wheatgrass seedings and the spread of fire-prone weeds such as cheatgrass.

We congratulate you on a job well done and are now looking forward to seeing the actual work on the ground.

Sincerely,

Charles Lobdell  
Field Supervisor

cc: Dick Giger, RO, Portland  
IDFG, Jerome  
BR, Boise

APR 12 1991

# The SHOSHONE-BANNOCK TRIBES

FORT HALL INDIAN RESERVATION

PHONE (208) 238-3748  
(208) 238-3900  
(208) 238-3914



FISHERIES DEPARTMENT  
P. O. BOX 306  
FORT HALL, IDAHO 83203

April 10, 1991

Mr. Bob Martin  
Wildlife Mitigation Specialist  
Idaho Department of Fish & Game  
600 South Walnut/Box 25  
Boise, ID 83707

Dear Bob:

On behalf of the Shoshone-Bannock Tribes, I wish to extend the Tribes' support of the Wildlife Mitigation Plan for the Minidoka Dam.

The Tribes participated fully with the interagency team in the field work and planning efforts. The Tribes believe that if the plan is implemented promptly and completely, the trust responsibility of the Bonneville Power Administration to the Shoshone-Bannock Tribes to mitigate for losses to wildlife due to development and operation of the Minidoka Dam will be met.

We urge prompt and complete funding of the projects delineated in the Plan.

Sincerely,

Susan Broderick  
Director, Tribal Fisheries Program

APR 12 1991



# United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
BURLEY DISTRICT OFFICE  
ROUTE 3, BOX 1  
BURLEY IDAHO 83318



IN REPLY REFER TO

6500

April 17, 1991

Mr. Bob Martin  
Idaho Department of Fish and Game  
600 South Walnut, Box 25  
Boise, ID 83707

Dear Bob:

The Burley District of the Bureau of Land Management would like to offer its appreciation for the opportunity to participate, over the last two years, in the work sessions that resulted in the Wildlife Protection, Mitigation and Enhancement Plan for the Minidoka Dam. The contents of this plan appear to have adequately determined the loss of wildlife habitat resulting from the construction of the Minidoka Dam. It also fairly recognized the additional habitat created due to the reservoir. The figure determined to be the overall net loss of habitat seems to be an equitable evaluation of the resulting habitat situation. The plan presents a reasonable set of options which would seek to replace the net loss of habitat for several key wildlife species. The options presented in the plan are consistent with BLM programs, policies and land use plans. Again, thanks for the opportunity to participate in this endeavor.

Sincerely,

*Gerald L. Quinn*  
Gerald L. Quinn  
District Manager